WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* ISOTOPE DEVELOPMENT PROGRESS

Here is a summary of some of the "public benefit" areas in current radioisotope development which the Atomic Energy Commission believes are of significance:

ø New Reactor-Produced Radioisotopes

✓ AEC funds permitted development of a method for routinely producing calcium 47 and iodine 125 for the first time in reactors. These have important medical and biological applications in the study of bone metabolism and thyroid function.

ø New Fission Product Extraction Processes

✓ A solvent extraction process has been developed for separation of strontium 90 and cesium 137 from high level radioactive wastes. The process has now been tested at the Hanford (Washington) works and, in an initial test run some 150,000 curies of strontium 90 has been separated. AEC considers this a "major breakthrough" in technology which will make available large quantities of low-cost fission-product radioisotopes.

✓ Another method permits recovery of cesium 137 from waste fission product supernates in underground storage tanks. More than 100,000 curies have now been separated by this technique.

ø Isotopic Heat and Power (See also, Washington SCIENCE TRENDS, July 3, 1961)

✓ A fully automatic and unattended weather station, powered by a radioisotope fueled (strontium 90) generator has been successfully developed and has been tested as a trial weather station by the Martin Company. The station will be permanently installed in the Canadian arctic this summer and should run for two years without any servicing or moving parts. Should this prove successful, a number of such weather stations could be placed around the Arctic, Antarctic and the Indian Ocean.

✓ Successful development of safe, efficient cesium 137 fuel form leading to the fabrication of a 5-watt electrical generator for seismographic recordings on the ocean floor.

✓ Development in progress on producing usable electrical power from a homogenous mixture of radioisotopic and semiconductor material. The AEC believes that successful development will lead to significantly smaller and more efficient isotopic power units than currently available, and will meet longstanding military and scientific needs.

(Continued)

* ISOTOPE DEVELOPMENT PROGRESS (Continued)

ø Water Resources

✓ AEC and U. S. Geological Survey have jointly developed radioisotopes techniques for accurately determining the storage capacity of natural underground reservoirs -- thereby permitting more effective use of the water reserve.

✓ A second joint AEC-Geological Survey project has resulted in successful development of a radioisotope technique for rating hydroelectric turbine generators. This method permits more accurate forecast of the amount of water which can be released for purposes other than generation of electricity.

✓ AEC and Federal Housing Administration have a joint project to develop a radioisotope tracer method for "early warning" of sewage breakthroughs to water wells. This will help prevent water contamination from such sources as the incomplete biological breakdown of common household detergents in septic systems.

✓ Research has started in treating sewage with radiation energy to increase the sewage sedimentation rate. By this means, the sewage can be more quickly discharged from the sewage plants.

ø Crime Detection

✓ AEC, in cooperation with the Internal Revenue Service, has under development a radioisotope technique to check the validity of age claims of imported liquors.

✓ Another joint project with Internal Revenue is aimed at pinpointing the geographical origin of raw opium.

✓ With the Federal Aviation Agency, work is being carried out on a nuclear technique for detecting hidden explosives in airline luggage. The method promised to be "accurate and rapid."

ø Air Pollution

✓ An automatic, highly sensitive radioisotope device for monitoring sulfur dioxide, a major air contaminant, is being developed and will be field-tested in conjunction with the California Air Pollution Foundation.

ø Space

✓ A radioisotope device is being developed in cooperation with the U. S. Weather Bureau and the Naval Ordnance Laboratory to determine atmospheric densities up to 100 miles, as well as methods for sampling atmospheric constituents to the fringes of outer space.

✓ A radioisotope sensing material, clathrate entrapped with krypton 85, is being investigated by the National Aeronautics and Space Administration for determining the atmospheric constituents of other planets.

ø Radiation Processed Foods

✓ Studies have determined that shelf-life extension of fish and fruit by radiation processing is potentially feasible.

✓ Experimental programs have been initiated to fully establish the technical and economic feasibility of radiation pasteurization of fish and fruits.

✓ Design and fabrication has been completed for the first experimental food irradiator. The unit employs 25,000 curies of cobalt 60; two more such units are on order.

* PATENT OFFICE PROBLEMS

The Kennedy Administration is standing behind recommendations for sharp increases in Patent Office fees, part of which would go toward a major increase in research and development programs in information retrieval.

Patent Commissioner David L. Ladd estimates that under the proposed charges the sum total of filing, final and maintenance fees would amount to some $1,000 if a patent is maintained in force for a full term of 17 years. Special provisions would be made for "garret-type individual inventors" who, today, make up a relatively small share of the nation's patent holders.

The Patent Office spent about $460,000 in research and development in 1961, but a report now under consideration by the Office envisions an annual R&D program of about $3 million.

Earlier this year, a committee under Dr. Gilbert W. King, Director of Research of IBM, warned that unless steps were taken in the near future "our present patent system will have to be abandoned or seriously modified."

Note: The problem of information retrieval is by no means confined to the Patent Office. The King report pointed out:

"It could very well be true that more than half the effort of the scientific and technological personnel of the world is now being spent in a duplication of previous effort. If this estimate is correct, then an efficient method of making available (such information) would double the effectiveness of the scientific community."

* SPACE SALARIES

Deputy Administrator Hugh L. Dryden has told Congress that the National Aeronautics and Space Administration may not be able to keep its key employees unless provision is made for higher salaries.

His argument:

"One of my industrial friends tells me that the current annual salaries for project managers in industry range from $18,000 to $35,000, the larger figure being for the largest projects. Their immediate superiors in charge of major programs or product development lines receive from $35,000 to $50,000 per year.

"Information from another company shows their managers of specific space projects range from $20,000 to $30,000 a year. Other sources having an industry-wide view of systems and project engineers inform us that salaries range from $14,000 for a project engineer of a subsystem or system to $35,000 for the project engineer on major projects.

* AUTOMATIC DETECTION FOR RADAR

The Navy has constructed and is testing a sequential detector which can apparently easily discriminate between radar signals and noise, even at extremely small signal levels. In addition, the savings, compared to fixed-sample detectors, range from around 30 percent to over 90 percent in detection time. Automatic detection can also be extended to other applications; for example deciding between many signal and noise alternatives. This, should it prove practical, would provide a signal classification process, where such additional parameters as velocity, identification, number of targets, track or other relevant characteristics enter into the detection process.

(Research and Development reported by J. W. Caspers, U. S. Navy Electronics Laboratory, San Diego, California)

TECHNICAL TRENDS

□ The Air Force intends to sign a contract relating to optical techniques for "Proposed Military Lunar and Interplanetary Guidance Systems" although lunar and planetary exploration is supposedly a perogative of the civilian space agency, NASA. √√√ The Atomic Energy Commission has proposed amending its regulations to permit the use of uranium as a high density counterweight in wing tips and tail pieces of aircraft exported to foreign countries other than those in the Soviet bloc. √√√ The Library of Congress, Science and Technology Division, is starting a one-year "census" of the world's scientific and technical journals and periodicals. √√√ A mechanical memory system installed in the Transit IV-A navigation satellite has proved capable of receiving and relaying data. Signals are released at precise intervals, measured by the extremely accurate pulses of an ultra-stable crystal oscillator.

□ The Sales and Distribution Section, BDSA, U. S. Department of Commerce, Washington 25, D. C. has available (at 10 cents each) studies of the market for U. S. microwave, forward scatter, radar and radio communications equipment in Bermuda, West Germany and Switzerland. √√√ The Army is looking for companies interested in developing a rotor blade ice detection system for all new Army helicopters. √√√ F. A. Payne, Jr. has been appointed Assistant Director of Defense Research and Engineering for Strategic Weapons. He was formerly Manager of Advanced Systems Planning of North American Aviation, Inc. √√√ The General Electric Company under a Navy contract, has successfully increased the strength of pure silver five-fold by blending into a small percentage of sapphire "whiskers". The composite was made by causing molten silver to infiltrate a pack of whiskers in a vacuum. It held up under tension of 118,500 pounds per square inch.

□ Bendix Corporation will design, build and test a prototype rocket-borne communications system under an $8 million Air Force contract, for use in situations where normal communications facilities are not available. √√√ The Bureau of the Budget has been asked by President Kennedy to look into many phases of the Government's various contracts with private institutions and enterprises for the operation and management of R&D programs and facilities, for analytical studies and advisory services, and for technical supervision of programs administered on a systems basis. A report is requested not later than December 1, 1961. √√√ A Commerce Department survey showing that U. S. capacity for vacuum melting and degassing has increased significantly is available as BD-61-144 from the Information Office, BDSA, U. S. Department of Commerce, Washington 25, D. C. √√√ The U. S. Bureau of Mines and the Northern Pacific Railway will cooperate in a joint program to determine whether coal in the State of Washington can be mined with water supplied at pressures up to 4,500 pounds per square inch.

□ A survey showing increasing U. S. tungsten production is available as Mineral Market Report M. M. S. No. 3262 from the Branch of Ferrous Metals, Division of Minerals, U. S. Bureau of Mines, Washington 25, D. C. √√√ The consulting firm of Booz-Allen & Hamilton, Chicago, has received the first contract to be issued by the new Office of Coal Research -- $139,000 to identify new products which would enable present coal markets to be expanded and new markets to be generated. √√√ Army aviation officials report favorably on the use of women's sunbonnets as instrument flight training hoods. Biggest advantage is that the cotton visor folds back easily and holds its position, allowing rapid transition from IFR to VFR with a flick of the wrist. √√√ Army tests indicate that airborne infrared sensors can detect the presence of under-snow camps on the Greenland icecap. Special problems relating to infrared sensing in the Arctic have led to recommendations that IR detectors sensitive to longer wavelengths be detected.

□ ELECTROLYSIS STUDIES: The National Bureau of Standards has been studying electrode reactions occurring in organic, nonaqueous media so as to apply this information to the electrodeposition of metals. In one application of this research, formamide was used to prepare a zinc bath from which zinc was successfully plated on a metal surface. The anhydrous, organic bath contained zinc acetate, potassium acetate and formamide. Coatings of zinc as much as 0.008 in. thick can be smoothly plated, the Bureau states.

(For details, write National Bureau of Standards, Office of Technical Information, Washington 25, D. C. regarding "Electrolysis of Simple Amides")

□ PORTABLE SHAKE TEST TABLE: Investigators at the Jet Propulsion Laboratory, Pasadena, Calif. have designed and built a "portable" oil-film table to improve the quality of component vibration testing in the horizontal plane. The 1200 pound table consists of a 24x24x4 inch steel surface plate attached to a base of 8 inch square tubing. Four casters make it possible to move the table from one shaker to another and three inverted hydraulic jacks provide necessary leveling ability. Tests results have been favorable enough to use the table for virtually all high-frequency vibration testing in the horizontal planes.

□ HOMING PARACHUTE SYSTEM: Investigators at the Sandia Corp., operating for the Atomic Energy Commission, are designing various types of homing parachute systems which may prove of considerable value in instrumentation or nose-cone recovery from space, and possibly in airdropping supplies and equipment -- particularly when visibility is low or an overcast exists. Key to the device is an electromechanical control system in which a direction-finding antenna is used to cause the parachute to guide toward the transmitter. The size of the control system is being reduced to approximately 6-inch overall diameter, while operating range is being increased to more than 50 miles.

(Details in Report SC 4537 (RR) available through AEC channels or at $1 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ AIRCRAFT FLAME DETECTOR: The Federal Aviation Agency has released a generally favorable 1960 report on a surveillance-type detector for sensing jet engine fires. The device (by Pyrotector, Inc., Hingham, Mass.) detected 93 percent of all the fires to which it exposed, functioned satisfactorily under several engine power conditions, and had a consistently short response times. FAA, however, recommended further development to make the system compatible with higher temperature environment.

(Report PB 171 028 available through FAA channels or at 75 cents from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ ALUMINUM FOIL FIRE SHELTER: The Forest Service has developed a new aluminum foil shelter for fire-fighters trapped by flames. In a test a volunteer stayed inside the shelter for 32 minutes while outside temperatures reached more than 600°F. Inside temperature was 130°F. The shelter, weighing about two pounds, is made of aluminum foil with fire-resistant cotton scrim and paper backing. It is carried on a fire-fighter's belt in the form of a rolled newspaper, but can be quickly unfolded to make a conical, tent-like shelter for one person.

(Shelter developed by Forest Service, U. S. Department of Agriculture, Missoula, Montana.)

PUBLICATION CHECKLIST

- GROUND EFFECT MACHINES, an account of research and development in the U. S. by H. R. Chaplin, U. S. Navy, originally presented at a symposium at The Hague in September, 1960. 32 Pages. (David Taylor Model Basin Report No. 1463 available through military channels or at $1 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- REVIEW OF THE NATIONAL SCIENCE FOUNDATION, a cursory study of this important Federal agency and some of its programs. Includes a tabulation of grants awarded to educational institutions in Fiscal Years 1960 and 1961. 37 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Bldg., Washington 25, D. C. for House Report No. 670)

- EMITTANCE OF STAINLESS STEELS, a compilation of original test data on emittance, reflectance and absorptance of stainless steels. 67 Pages. (Single copies free to Government agencies, their contractors, subcontractors and suppliers. Write Defense Metals Information Center, Battelle Memorial Institute, Columbus 1, Ohio for DMIC Memorandum No. 111)

- ENGINEERING APPLICATIONS OF ANALOG COMPUTERS, a presentation of six problems from the fields of reactor engineering, heat transfer and dynamics designed to provide insight into physical phenomena and their mathematical representation. 48 Pages. (Report ANL - 6319 available through military channels or at $1.25 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- INFLATABLE STRUCTURES IN SPACE, testimony, statements and exhibits from Government and industry on the fast-growing field of inflatable or expandable space structures. 56 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Building, Washington 25, D. C. for Hearing No. 12 - Inflatable Structures)

- TROPOSPHERIC PROPAGATION, a National Bureau of Standards report on the results of studies on the short-term variability of tropospheric signals received over within-the-horizon paths. Includes an evaluation of fadeouts over a path using a mountain peak as a diffracting knife edge-like obstacle between transmitter and receiver. 40 Pages. $2. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for NBS Technical Note No. 88)

- SENSORY AND PERCEPTUAL PROBLEMS RELATED TO SPACE FLIGHT, a study of visual problems within and outside a space vehicle and various theories related to sensation and perception. Includes suggested areas of research. 51 Pages. (Write Printing and Publishing Office, National Academy of Sciences, Washington 25, D. C. regarding Publication No. 872)

- MAGANESE MINERALS, a technical report on the thermal behavior of such minerals in controlled atmospheres. 35 Pages. Single Copies Free. (Write Publication-Distribution Office, U. S. Bureau of Mines, 4300 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5761)

- HARVARD UNIVERSITY REPORTS, a checklist of papers from the Division of Engineering and Applied Physics published between April 1960 and April 1961. 4 Pages. Single Copies Free. (Write The Librarian, Gordon McKay Library, Harvard University, Pierce Hall, Cambridge 38, Mass.)

- MACHINE TRANSLATION, a summary of more than 300 references to this field and a brief listing of some organizations engaged in machine translation work. Single Copies Free. (Write Specialized Information Section, EPA-OEEC, 3 rue Andre Pascal, Paris XVI, France for Question and Answer Summary QR 1834)